Kawasaki

Gas Turbines

National Turbine Technology And Regulatory Forum

5, 6 March 2003

San Diego, CA

Ideal Customer Characteristics

- High Electric Demand And Consumption
- Significant Heating And Cooling Requirements

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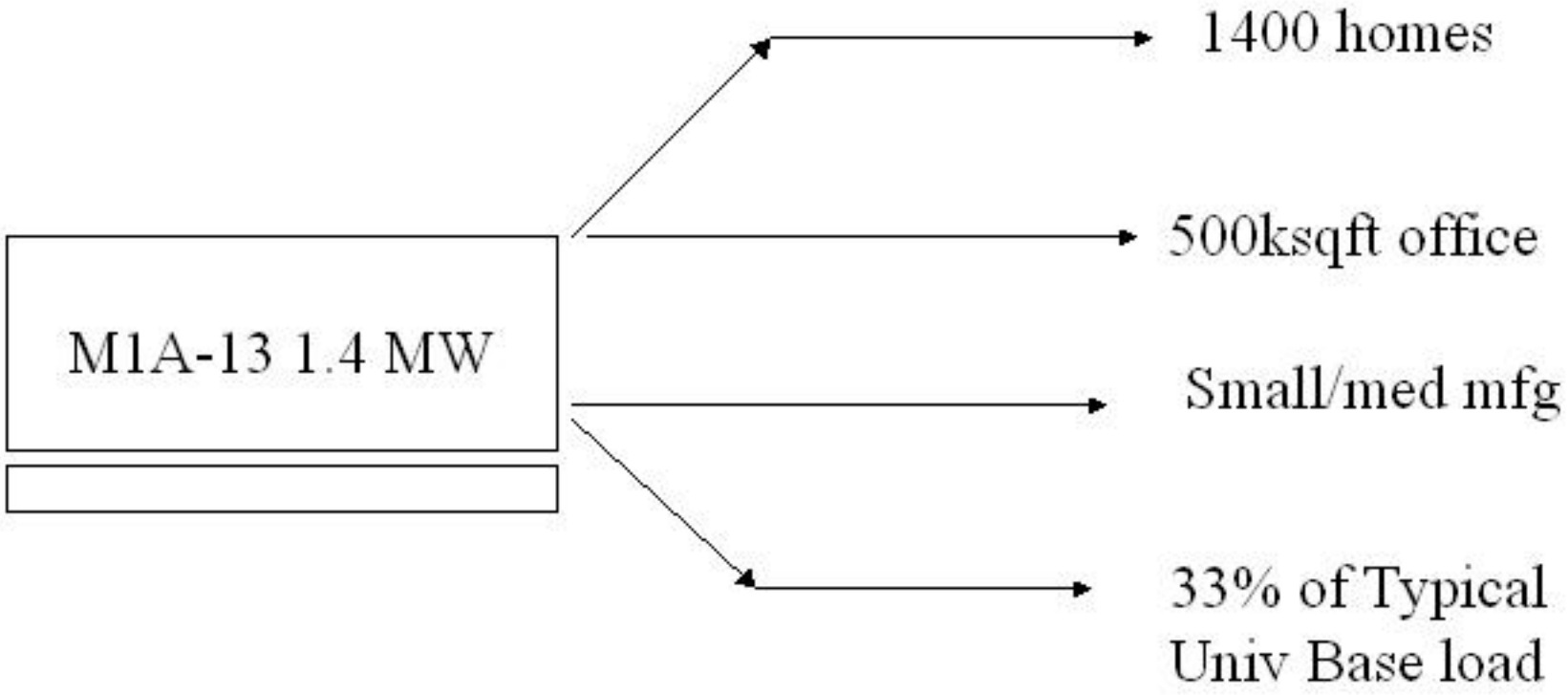
Electricity:
GT Driven Genset



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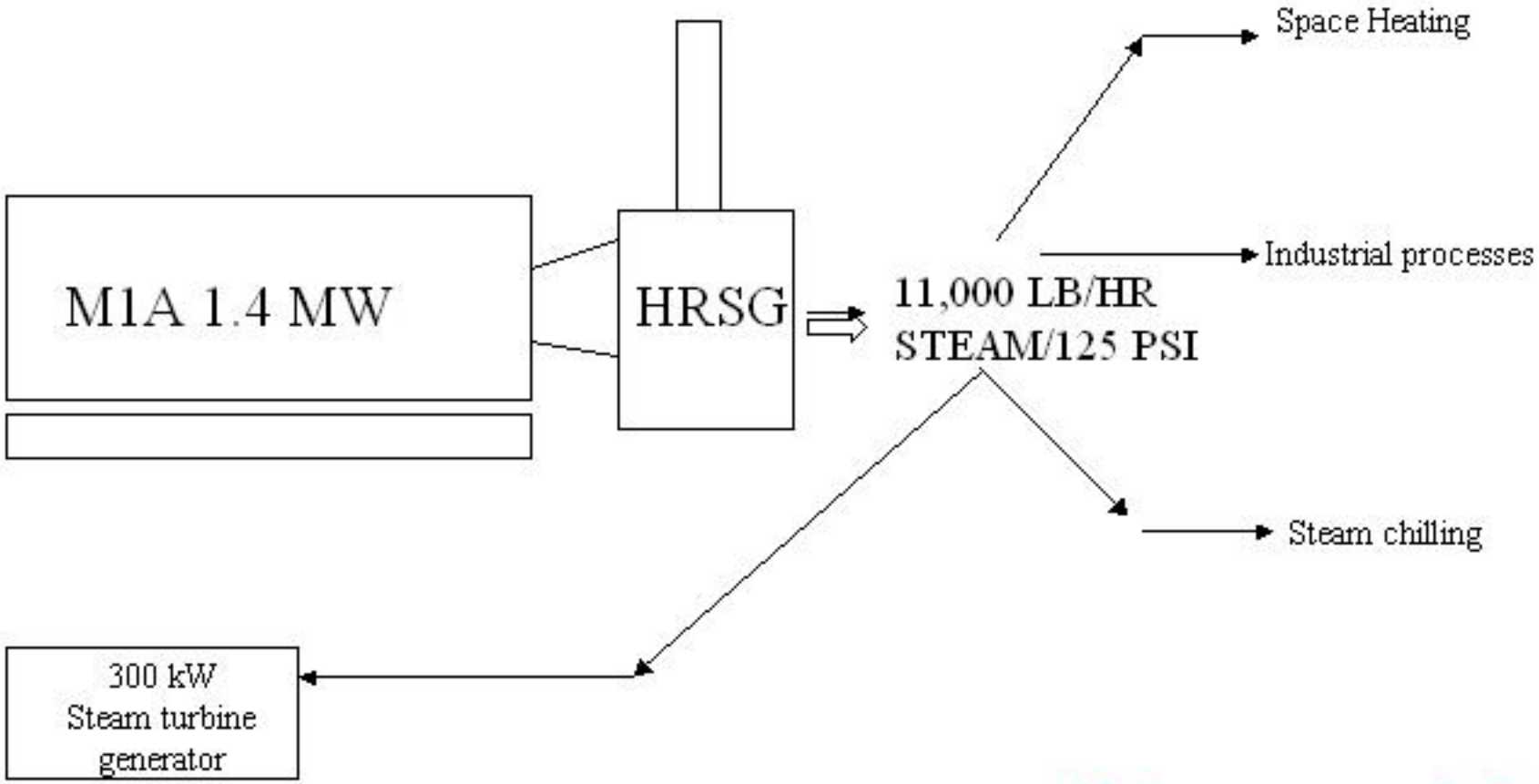
Heat:
GT Exhaust Heat Recovery



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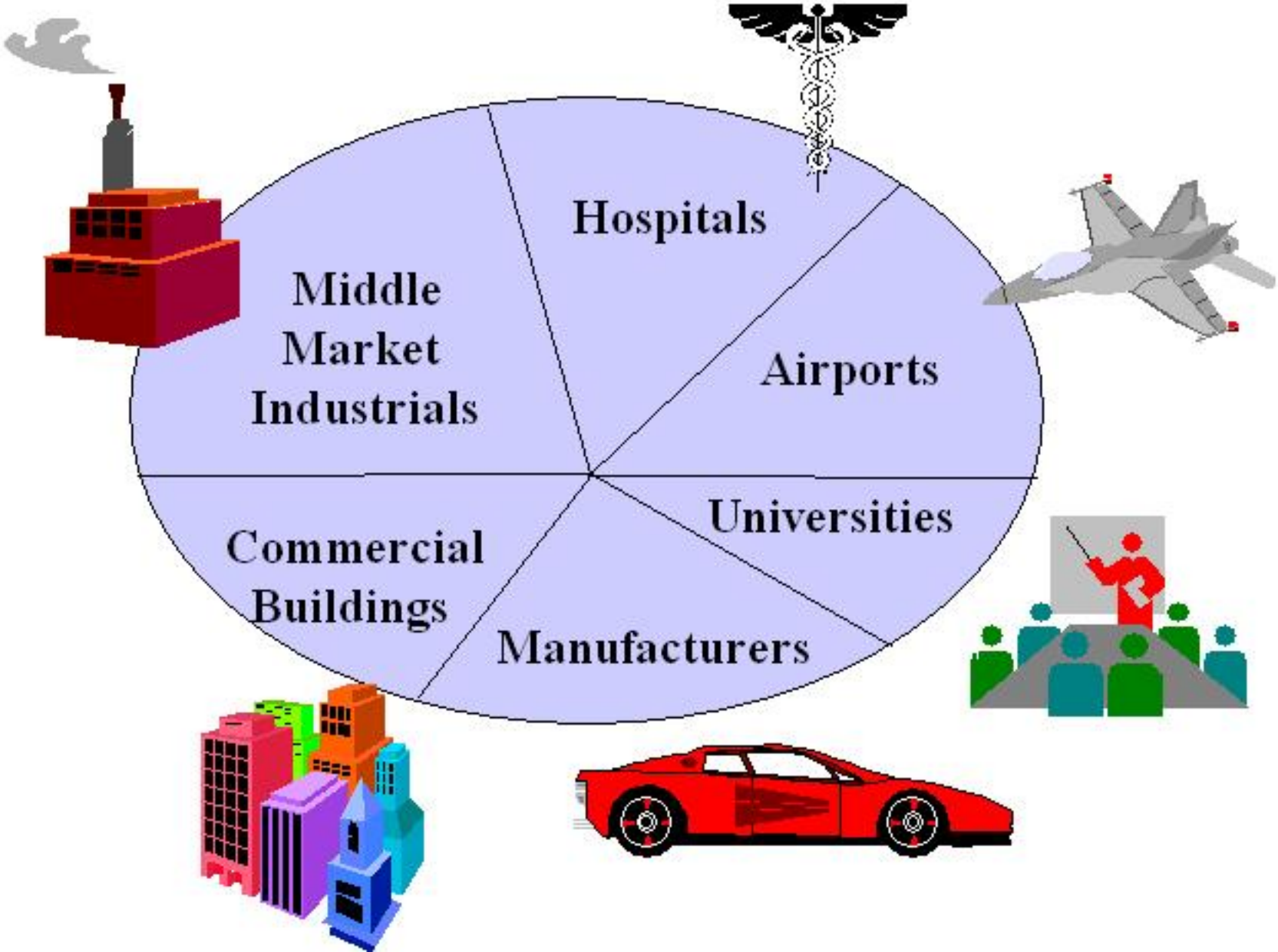
TARGET CUSTOMERS



Application Breakdown

- Baseload Applications
  - Factory (65%)
  - Hotel / Buildings (13%)
  - Hospital (11%)
  - District Heating (7%)
  - Others (4%)

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Application Breakdown

- Standby Applications
  - Government (34%)
  - Telecom (23%)
  - Hospital (14%)
  - Bank / Computer (10%)
  - Hotel (5%)
  - Factory (5%)
  - Others (9%)

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Public Bank ITTC

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Public Bank ITTC

1. G/T	Type : Simple-open cycle, single shaft Model :KAWASAKI M1A-13 Construction : Compressor ; radial 2 stage Turbine ; axial 3 stage Combustor ; Single can Output: 915 kWe at 30° C Turbine Speed : 22,000rpm Fuel : Natural Gas/Diesel	3. Generator	Type : Synchronous generator Output : 1,300 kVA Power factor : 0.8 Voltage : 415 V
		4. HRSG	Type : Natural circulation type, Water tube boiler Evaporation : 3.7 t/h Steam press.: 8.5 kg/cm2-G at 173° C
2. Main G/B	Type : Epicyclic gear Bearing : Sleeve bearing Shaft speed : 1,500rpm	5. Gas Comp.	Type : Single Stage Screw (Electrical Motor Driven) Capacity : 525 [Nm3/H] Pressure : 14 [kg/cm2-G]

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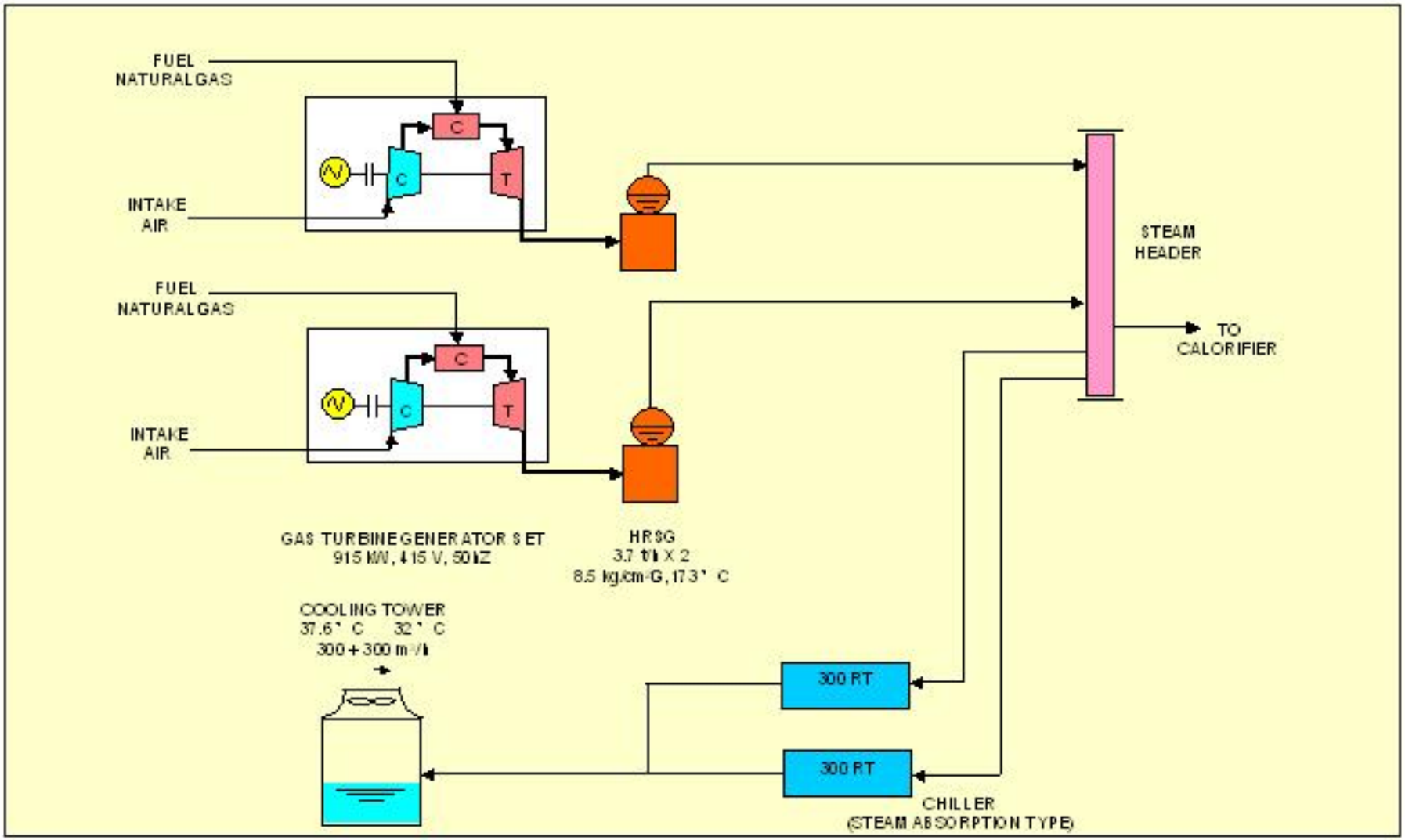

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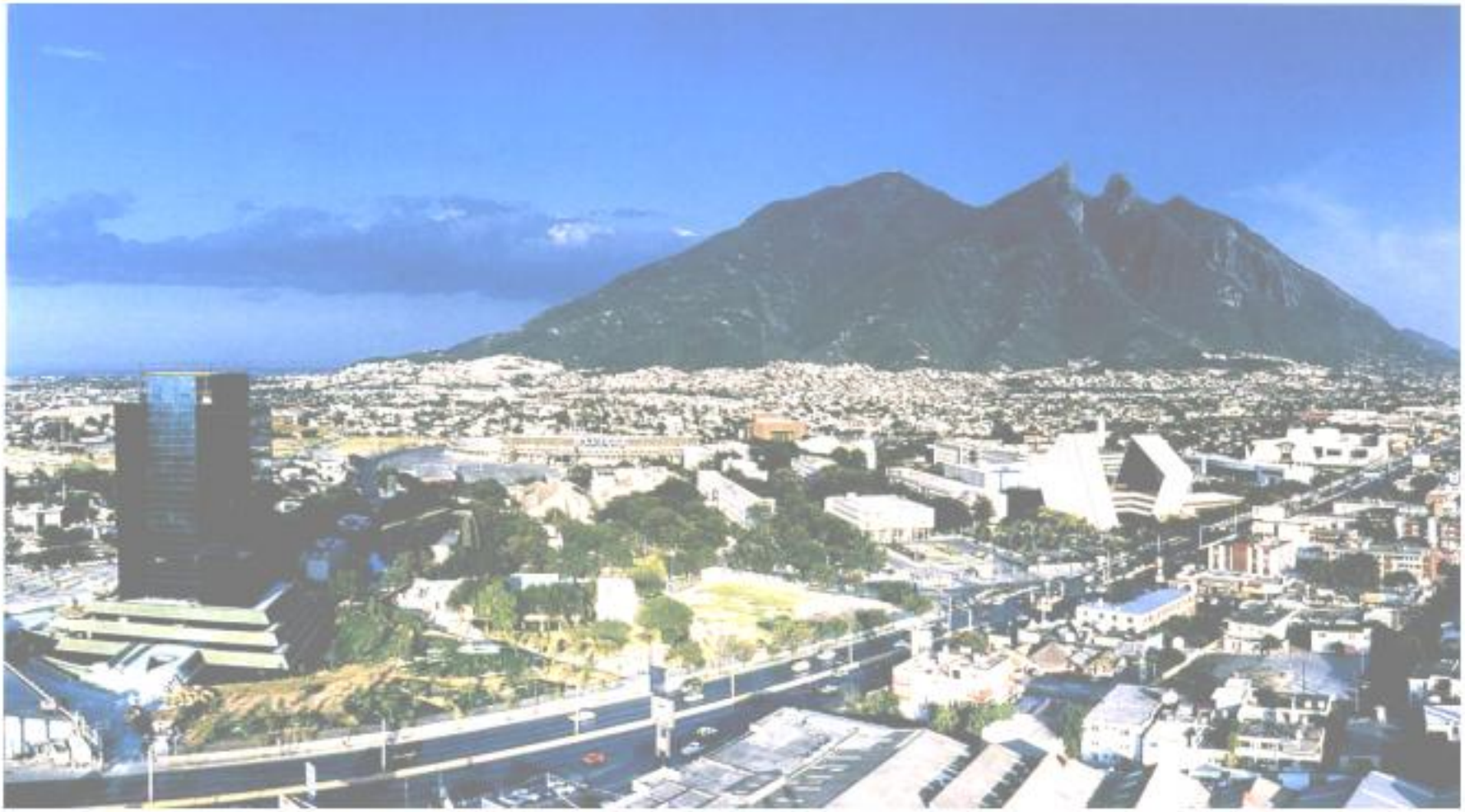
Propasa Paper



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Propasa Paper

1. G/T	Type : Simple-open cycle, single shaft Model :KAWASAKI M7A-02 Construction : Compressor ; axial 12 stage Turbine ; axial 4 stage Combustor ; 6 cans Output: W at 15℃ at gene.Terminal Turbine Speed : 14,000rpm Fuel : LNG NOx abatement :DLE Engine (lean burn)	3. Generator	Type : Synchronous generator Output : kVA Power factor : Voltage : 13,800V
		4. HRSG	Type : Natural circulation type, Water tube boiler Evaporation : 36.5 t/h with suppl.burner Steam press.: 30 kg/cm^2-G at 310℃
impulse (back pressure)		5.S/T	Type :Reduction speed type Output: We at 15 ℃ Turbine speed : rpm
2. Main G/B	Type : Parallel gear Bearing : Sleeve bearing Shaft speed : 1,800rpm		

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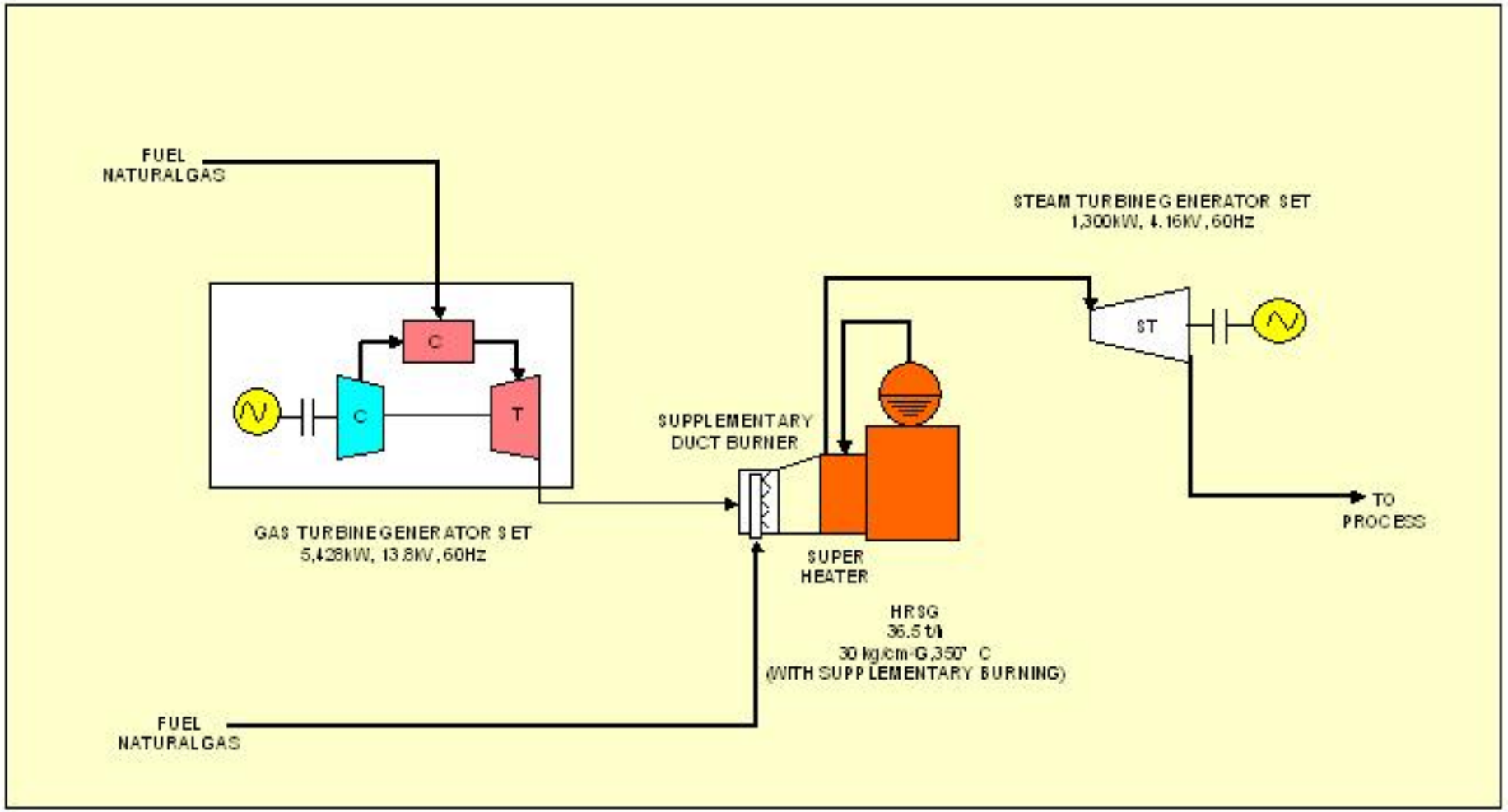
Propasa Paper



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Fersinsa Penicillin Plant

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Ponderosa Papers

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Celfimex Concrete

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Other Installations

- Baseload Installations - North America
  - Southern Alberta Institute of Technology
  - Ferris State College (MI)
  - Norwalk Hospital (CT)
  - St. Vincent's Hospital (FL)
  - Sonoma Development Center (CA)

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Project Economics

- Payback
  - Many Less Than Four Years
  - Some Less Than Two Years

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Environmental Benefits

Depends On Technology Of Existing Power Supply And Boiler

- CO_2 Emissions Reduced By 35 - 50%
- NOx Emissions Reduced By 20 - 70%

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Environmental Benefits

Kawasaki GPB15X With 2.5 PPM NOx Guarantee

"One Tonne Son"

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Summary

There are many applications for small turbines so long as the exhaust heat can be utilized.

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Summary

The environmental benefits of distributed generation, especially with the new combustion technologies that have been developed, are substantial.

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Kawasaki Gas Turbines - Americas

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